

REMARKS

Applicants acknowledge receipt of a Final Office Action dated January 4, 2006. In this response Applicants have amended claims 1, 6, 11, 16, and 21. Claims 2, 7, 12, 17, and 23 have been canceled without prejudice or disclaimer. Following entry of these amendments, claims 1, 3-6, 8-11, 13-16, and 18-22 are pending in the application.

Reconsideration of the present application is respectfully requested in view of the foregoing amendments and the remarks which follow.

Rejections Under 35 U.S.C. § 102

On page 2 of the Office Action, the PTO has rejected claim 21 under 35 U.S.C. § 102(b) as allegedly being anticipated by JP 2001-121285 to Shimizu (hereafter "Shimizu"). Applicants respectfully traverse this rejection for the reasons set forth below.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Bros. v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). See generally MPEP §2131.

Here, Shimizu fails to disclose a lead-free joining material "wherein the concentration of the additive element in the core part is in a range of 0.3 % to 1.0 % by weight." Accordingly, Applicants submit that the outstanding rejection under §102 is improper and ought to be withdrawn.

In view of the foregoing, Applicants respectfully request reconsideration and withdrawal of the outstanding rejection under §102.

Rejections Under 35 U.S.C. § 103

On page 3 of the Office Action, the PTO has rejected claims 1-23 under 35 U.S.C. § 103(a) as allegedly being unpatentable over JP 2002-283093 to Tadauchi (hereafter "Tadauchi"). Applicants respectfully request reconsideration and withdrawal of the outstanding rejection under §103.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to

combine reference teachings. Second, there must be a reasonable expectation of success. Finally, prior art references must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in Applicants' disclosure. *In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991).

As an initial matter, and with particular regard to independent method claim 22, Applicants note that Tadauchi fails to teach or suggest the steps of "(1) melting tin, zinc, and at least any one of bismuth and germanium as an additive element to form a molten liquid," "(2) forming the molten liquid into droplets," and "(3) solidifying the droplets into particles." Accordingly, Tadauchi cannot render claim 22 obvious, and the outstanding rejection of claim 22 based upon Tadauchi should be withdrawn.

Independent claims 1, 6, 11, and 16 recite a lead-free joining material, solder paste, or joining method that includes a core part "wherein the concentration of the additive element in the core part is in a range of 0.3 % to 1.0 % by weight" and a surface layer covering the core part that includes a "solid-solution phase in which a concentration of [an] additive element is higher than a concentration of the additive element in the core part, and the concentration of the additive element in the solid-solution phase is in a range of 0.6% to 4.0 % by weight," and "a needle crystal which is more than a core part, is dispersed in the solid-solution phase and includes the zinc as a main component." Further, each of independent claims 1, 6, 11, and 16 now recite, the process steps of "(1) melting tin, zinc, and at least any one of bismuth and germanium as an additive element to form a molten liquid," "(2) forming the molten liquid into droplets," and "(3) solidifying the droplets into particles." Claims 3-5, 8-10, 12-15, and 18-20 depend upon claims 1, 6, 11, and 16.

In the Office Action, the PTO acknowledges that Tadauchi may not disclose an additive element concentration, particularly of bismuth, of 0.6 % to 4.0 % by weight in the solid-solution phase of the surface layer, and that Tadauchi may not disclose a needle crystal dispersed within the solid-solution phase including zinc as a main component. See Office Action at page 3. The PTO argues that the material disclosed by Tadauchi would inherently have the same structures and properties as the claimed lead-free joining material because Tadauchi discloses an identical or substantially identical manufacturing process. See Office Action at pages 3-4. As set forth in more detail below, Applicants respectfully disagree and submit that the process of Tadauchi is not identical, that the differences in the processes

produce structurally different products, and that the PTO's suggestion that the material of Tadauchi inherently possesses the characteristics of the presently claimed invention is improper, certainly in the context of an obviousness rejection.

Tadauchi does not disclose, teach, or suggest the claimed lead-free joining material. The manufacturing process disclosed in Tadauchi is not identical or substantially identical to the exemplary process disclosed in the present application. Tadauchi discloses a manufacturing process in which molten liquid is ejected through a nozzle into a cooling bath that is filled with mineral oil, causing the droplets to solidify into particles. See Tadauchi. at paragraphs 0023-0024. Applicants obtained and provide herewith a copy of a machine translation of Tadauchi. Reference to specific passages in Tadauchi are based upon the machine translation. The cooling bath of mineral oil would provide a certain microstructure upon solidification of particles due to the cooling rate that is provided by the mineral oil. This cooling rate would be different than that disclosed by way of example in Applicants' specification and would result in a different microstructure. For example, in Applicants' exemplary process, droplets of molten liquid are solidified in a highly pure inert gas atmosphere, resulting in a rapid solidification rate for the droplets. See specification at page 11, lines 14-26; page 12, lines 1-3. This exemplary method of solidification provides a different rate of solidification, and a person skilled in the art would readily recognize that this would result in a different microstructure than the material disclosed by Tadauchi. Therefore, the process disclosed by Tadauchi is not identical or substantially identical and a person skilled in the art would not expect the materials of Tadauchi to possess the presently claimed features.

Claims 1, 3-6, 8-11, 13-16, and 18-22 are allowable over Tadauchi for at least the reasons noted above. Furthermore, claims 5, 10, 15, 20, and 21 recite that an average concentration of the additive element in the whole lead-free joining material is in a range of 0.6 % to 1.0 % by weight. Tadauchi discloses a tin-zinc alloy that further includes over 1 % and below 3 wt % of at least one of bismuth, silver, aluminum, magnesium, nickel, manganese, silicon, copper, zirconium, germanium, and niobium. See abstract of Tadauchi. Therefore, Tadauchi discloses an alloy with a distinctly different additive element composition range than that recited in claims 5, 10, 15, 20, and 21. Furthermore, the material disclosed by Tadauchi will have a different microstructure upon solidification than the material claimed by the Applicants because of the differences in composition between the

material disclosed by Tadauchi and the material claimed by the Applicants. This compounds the differences in microstructure due to the differences in manufacturing noted above. For example, the composition disclosed by Tadauchi would not result in a material with a surface layer that has a solid-solution phase with an additive element concentration of 0.6 % to 4.0 % by weight. For at least these reasons, withdrawal of this rejection is respectfully requested.


In view of the foregoing, Applicants respectfully request reconsideration and withdrawal of the outstanding rejection under §103.

CONCLUSION

In view of the foregoing amendments and remarks, Applicants respectfully submit that all of the pending claims are now in condition for allowance. An early notice to this effect is earnestly solicited. If there are any questions regarding the application, the Examiner is invited to contact the undersigned at the number below.

Respectfully submitted,

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